

REMARKS

The undersigned thanks the Examiner for the courtesies extended during the interviews of May 2, 2007, and July 24, 2007. During these interviews, the Examiner provided helpful suggestions to overcome the pending obvious/Aess rejections over Kidwell in view of McCormick. Applicants have adopted these helpful suggestions of the Examiner in this Amendment. During the interview of July 24, 2007, the Examiner clarified that the Action of July 18, 2007, was a non-final Action as stated on the Office Action Summary, not a final Action as stated on page 9 of the Action.

The Interview Summary of May 2, 2007, states: “Applicant will focus arguments on why it is not obvious to combine the organic molecule of McCormick with the colloids produced by Kidwell or focus on elements and method steps not found in McCormick or Kidwell such as any physical elements and methods required specifically for Raman detection.” Applicants agree with the Interview Summary.

During the interview of May 2, 2007, the Examiner suggested the following:

(1) Applicants should focus on why it would not have been obvious to combine the organic molecule of McCormick with the colloids produced by Kidwell.

(2) Applicants should consider adding a limitation that clarifies that the organic molecule is a “Raman label” as neither McCormick nor Kidwell teach or suggest using a Raman label.

(3) Applicants should consider providing evidence showing that the combination of metallic colloid **and** Raman-enhancing organic molecule on the surface of the metallic colloid in the claimed cluster of surface-modified metallic colloids contribute to producing a Raman signal enhancement that is greater than the enhancement provided by a silver colloid prepared by a prior art titration method of the prior art.

The amendments to the claims are supported as follows:

(a) The limitation “a cluster of surface-modified metallic colloid comprising (1) metallic colloid comprising a metal and (2) a Raman-enhancing organic molecule on a surface of the metallic colloid” in claims 1 and 54 is supported by Figure 3(2), which shows a cluster of surface-modified metallic colloid having a plurality of the surface-modified colloid, each surface modified colloid having a metallic colloid and an organic molecule on the surface of the metallic colloid. Note that the heading of Figure 3(2) states, “Surface of aggregated metallic particles are modified and proteins are adsorbed on the aggregate.” Note that the terms “colloid” and “metallic particles” suspended in a liquid are used interchangeably in the specification as the term “colloid” is defined as “metal particles suspending in a liquid.” See paragraph [0016]. Also, note that the metallic particles in Figure 3(2) are “modified” by “attaching an organic molecule to the surface of the colloids.” See paragraph [0019]. The “organic molecule” refers to “a Raman-enhancing organic molecule,” which is supported by paragraph [0019] of the specification:

In another embodiment of the invention, *the metallic colloids produced by invention methods are modified by attaching an organic molecule to the surface of the colloids.* Organic molecules contemplated for use in the practice of the invention are typically less than about 500 Dalton in molecular weight, and are bifunctional organic molecules. As used herein, “bifunctional” means that the organic molecule has a moiety that has an affinity for the metallic surface, and a moiety that has an affinity for a biomolecule. *Such surface modified metallic colloids exhibit an increased ability to bind biomolecules, thereby resulting in an enhanced and reproducible SERS signal.* The colloids can be used either individually, or as aggregates for binding certain biomolecules. [Emphasis added.]

(b) The limitation “modifying the metallic colloid by attaching the Raman-enhancing organic molecule to the surface of the metallic colloid to produce the surface-modified metallic colloid” in claims 1 and 54 is supported by paragraph [0019] of the specification, which states that “the metallic colloids produced by the methods of this invention are modified by attaching an organic molecule to the surface of the colloids.”

(c) The limitation “aggregating a plurality of the surface-modified metallic colloid to form the cluster of surface-modified metallic colloid” in claims 1 and 54 is supported by Figure

3(2), wherein the heading of this figure states, “Surface of aggregated metallic particles are modified and proteins are adsorbed on the aggregate.” Figure 3(2) shows a cluster of surface-modified metallic colloid produced by aggregating a plurality of the surface-modified colloid.

McCormick and Kidwell fail to teach or suggest the claimed invention as a whole

Claims 1 and 54 have been amended to recite “A method for producing *a cluster of surface-modified metallic colloid* comprising (1) metallic colloid comprising a metal and (2) *a Raman-enhancing organic molecule on a surface of the metallic colloid*.” Both McCormick and Kidwell fail to teach or suggest “a cluster of surface-modified metallic colloid” that has “a Raman-enhancing organic molecule on a surface of the metallic colloid” as neither McCormick nor Kidwell teach or suggest using a Raman label. Thus, the cited art fails to teach or suggest the claimed invention *as a whole*.

Why it would not have been obvious to combine the organic molecule of McCormick with the colloids produced by Kidwell?

Applicants submit that it would not have been obvious to combine the organic molecules of McCormick with the colloids produced by Kidwell as organic molecules could potentially hinder “aggregating a plurality of the surface-modified metallic colloid to form the cluster of surface-modified metallic colloid” as recited in claims 1 and 54. Persons of ordinary skill in this art would recognize that *stronger* surface plasmon resonance of metallic colloids occurs when metallic colloids are *aggregated* to form clusters. During the course of the present invention, Applicants recognized that when the metallic colloids are aggregated to form clusters, the Raman signal from a one metallic colloid particle of a cluster can resonate with the Raman signal from the other metallic colloid particles of the cluster. Thus, in the embodiments of the present invention, the metallic colloid particles of the cluster synergistically act as signal enhancers.

On the other hand, McCormick teaches modifying a metallic nanoparticle with an organic molecule, such as a thiol containing long chain molecule, “in order to form stable, metal

nanoparticles in a facile manner.” See Action of July 18, 2007, page 3, lines 3 and 4 from the bottom of the page. By reading McCormick, persons of ordinary skill in this art would have considered that the addition of the organic molecules of McCormick to the metallic colloid of Kidwell would “form stable, metal nanoparticles” of Kidwell. However, formation of individual stable, metal nanoparticles of Kidwell would *not* result in “aggregating a plurality of the surface-modified metallic colloid to form the cluster of surface-modified metallic colloid” as recited in claims 1 and 54. Thus, persons of ordinary skill in this art would not have been motivated to combine the organic molecule of McCormick with the colloids produced by Kidwell.

Limitation that clarifies that the organic molecule is a “Raman label”

Claims 1 and 54 now recite that the organic molecule is a *Raman-enhancing* organic molecule, not just any ordinary organic molecule.

Evidence showing that the combination of metallic colloid *and* Raman-enhancing organic molecule on the surface of the metallic colloid in the claimed cluster of surface-modified metallic colloids contribute to producing a Raman signal enhancement that is greater than the enhancement provided by a silver colloid prepared by a prior art titration method of the prior art

On page 2, last paragraph of the response filed on March 19, 2007, Applicants argued:

Applicants claim a metallic colloid that includes both a metal and an organic molecule. As explained in the specification, both the metal *and* the organic molecule contribute to producing a Raman signal enhancement that is greater than the enhancement provided by a silver colloid prepared by a [prior art] titration method as claimed. Neither Kidwell nor McCormick discloses or suggests utilizing a metallic colloid with the specific organic molecules disclosed in Applicant’s specification. Accordingly, the claimed Raman signal enhancement would not necessarily result from the metal particles disclosed in Kidwell or McCormick.

In response to this argument, the Examiner stated the following in the Advisory Action of April 3, 2007:

Applicant argues that the instant specification teaches both the metal and the organic molecule contributing to the Raman signal enhancement that is greater than the enhancement provided by a silver colloid prepared by a titration [sic, titration] method and neither Kidwell nor McCormick discloses or suggests the metallic colloid with the specific organic molecules as described in applicant's specification and therefore the enhancement would not be an inherent property of the colloid. Applicant's argument is not persuasive because in example 1 of the instant specification, parts A and B disclose preparing colloidal particles by titration and heating after dissolving the precursor. Example 1 also discloses comparing the Raman enhancement of the claimed method with the colloids prepared by the titration method, but does not specify that the organic molecules have been attached at the time of comparison nor during the colloidal preparation method. Therefore, the comparison of only the metallic colloids and not organic molecules takes place and the property is inherent to any metallic colloids prepared by the recited method. Furthermore, McCormick teaches the organic molecule of the instant specification and the combination of Kidwell and McCormick teach the molecule attached to the metallic colloid particle. Therefore, the enhancement property is inherent to the colloid produced by the combination of references.

Applicant agrees with the Examiner that Example 1 of the specification “discloses comparing the Raman enhancement of the claimed method with the colloids prepared by the titration method, but does not specify that the organic molecules have been attached at the time of comparison nor during the colloidal preparation method.” During the interview of May 2, 2007, the Examiner said that Applicants should provide evidence on the record showing that both the metallic colloid **and** the organic molecule on the surface of the metallic colloid contribute to producing a Raman signal enhancement that is greater than the enhancement provided by a silver colloid without any organic molecule prepared by a prior art titration method as explained in the specification. In light of this suggestion of the Examiner, Dr. Tae-Woong Koo, the first named inventor on this application, herewith provides a Rule 132 Declaration under 37 CFR 1.132 showing that both the metallic colloid **and** organic molecule on the surface of the metallic colloid contribute to producing

a Raman signal enhancement that is greater than the enhancement provided by a silver colloid prepared by a prior art titration method as explained in the specification.

In view of the above amendment and attached Rule 132 Declaration, which have been prepared as suggested by the Examiner, Applicants believe the pending application is in condition for allowance.

Dated: August 7, 2007

Respectfully submitted,
By /Raj S. Davé/
Raj S. Davé
Registration No.: 42,465
DARBY & DARBY P.C.
P.O. Box 5257
New York, New York 10150-5257
(202) 639-7515 (Phone)
(212) 527-7701 (Fax)
Attorneys/Agents for Intel Corporation